

Chemical status of the French part of the Scheldt district

Simulations for the period 2003-2005

Prygiel J.^{1,2}, Castelain D.¹, Pruvot F.¹



1) Agence de l'Eau Artois-Picardie, 200 rue Marceline, F-59500 Douai, France

2) Université des Sciences et Technologies de Lille, PBDS UMR CNRS 8110, Bât. C8, F-59655 Villeneuve d'Ascq Cedex

INTRODUCTION

The 2000/60/CE Water Framework Directive (WFD) defines the status of a water body as the worse between the ecological and chemical status. The chemical status as well as its long term evolution is assessed by a Surveillance Network, the sites of which are representative of water body types which are present in the districts. For each surveillance site and for water environment only, 41 substances will be analysed. 33 belong to the annex X of the WFD, and 8 belong to the annex IX. Analyses will be carried out monthly for two years of the six years corresponding to the management plan.

The annual mean values have to be compared to Environmental Quality Standards (EQSs) which have to be definitively determined in 2007. The aim of this study is to assess the chemical status of the French part of the International Scheldt District (ISD) by using existing data and by testing three hypotheses. One is defined by the Direction de l'Eau du Ministère de l'Ecologie et du Développement Durable (MEDD) in its circular from July 2005 (H1 hypothesis). An other is defined by the European Union in a proposal of directive from July 2006 (H2 hypothesis). The last one is a combination of the formers and is based upon European proposals except when French EQSs proposals are higher (H3 hypothesis)

THE SURVEILLANCE MONITORING NETWORK

41 sites on 49 Artois-Picardie basin surveillance network belong to the ISD. They have been selected according to their belonging to hydroecoregions and the size of water courses as requested by the circular WFD 2006/16 of the MEDD from 13 July 2006.

METHODOLOGY

Analyses have been realised by the Institut Pasteur de Lille. The following rules have been used. When concentrations were below the limit of detection (LD), the LD/2 was used for the annual mean calculation. As the surveillance network started only in 2007, assessments have been carried out with 2005 data. In the absence of 2005 date, 2004 and then 2003 data have been used. If only one substance annual mean concentration exceeds the EQS, then the site cannot meet the good chemical status.

RESULTS

41 substances are relevant for the chemical status. But the EU distinguishes different molecules for some parameters such as DDT and para para DDT (parameter 1 of annex IX) as well as the French circular which for example distinguishes hexachlorocyclohexane alpha, beta, delta and gamma for the parameter 18 of the annex X. So, the total number of parameters is 55.

Many blanks occur in results.

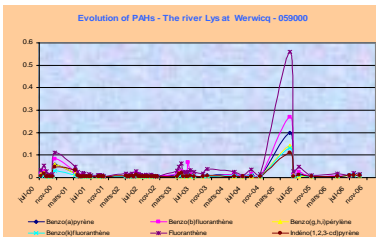
Some molecules were only searched in sediments till now (metals, PAHs, naphtalene for example),

Some molecules were not searched at all (isodrine, TBT...) or very recently only (DEHP)

Different types of molecules:

Molecules present everywhere but with very low concentrations, mainly below the detection limit (alachlore, atrazine, simazine...). These molecules are never inducing a bad status whatever the hypothesis,

Molecules present at very low concentration except for some rare sites (site 059000 - Lys aval at Werwiq for example). They don't allow the good status whatever the hypothesis (isoproturon, diuron, fluoranthene, PAHs – see f.e. benzo(a)-pyrene),

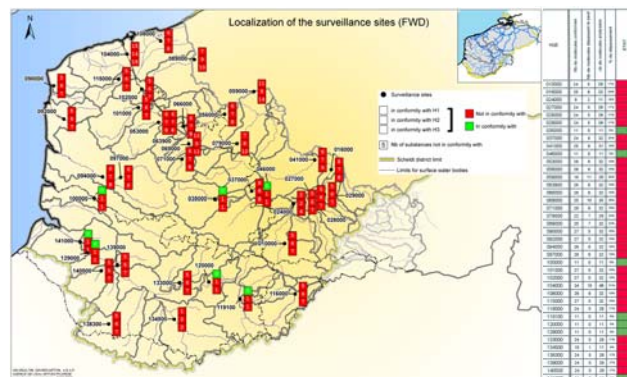


Only the one of July 2005 campaign mentions abnormally high concentrations for the 6 PAH analysed. These concentrations are sufficient so that the annual means are superior to the EQS corresponding to hypotheses H1 and H2.

CHEMICAL STATUS OF SURVEILLANCE SITES

WFD reference number	Relevant substances (25 from annex X and 8 from annex IX of WFD)	French circular proposals (µg/L)	EUQS proposals (µg/L)	Reference period	Annual means (µg)		LD	No of sites n = 49	Site conformity			Comments
					Min.	Max.			H1	H2	H3	
1	ALACHLOR	0.3	0.3	2005	0.005	0.008	0.005	1	30	30	30	
2	ATRAZINE	0.1	0.1	2005	0.002	0.016	0.002	1	30	30	30	
3	ATRAZINE	0.8	0.8	2005	0.01	0.055	0.01	37	30	30	30	
4	BENZENE	1.7	10	2005	0.3	0.3	0.3	0	30	30	30	LD > H2
5	PENTABROMODIPHENYLETHÉR	0.005	0.005	2005	0.05	0.05	0.05	0	30	30	30	LD > H2
5	DECA-BROMODIPHENYLETHÉR	0.005	0.005	2005	0.05	0.05	0.05	0	30	30	30	LD > H2
6	CADMIUM	5	0.08	2005	1	1	1	0	30	30	30	
7	1,2,3-TRICHLOROBENZENE	0.4	0.4	2005	0.02	0.02	0.02	1	30	30	30	
7	CHLORFENVINPHOS	0.005	0.1	2005	0.1	0.32	0.1	1	30	30	30	
9	CHLORPYRIFOS	0.02	0.02	2005	0.1	0.1	0.1	0	30	30	30	LD > H2
10	1,2-DICHLOROETHANE	10	10	2005	10	10	10	0	30	30	30	
11	DICHLOROMETHANE	40	50	2005	10	10	10	0	30	30	30	
12	DIDECYLDIMETHYLPHOSPHATE (DEHP)	1.3	1.3	2005	0.756	4.47	0.25	16	30	30	30	
13	DIURON	0.2	0.2	2005	0.01	0.58	0.01	37	30	30	30	
14	ENDOSULFAN	0.050	0.050	2005	0.02	0.02	0.02	0	30	30	30	LD > H2
15	FLUORANTHÈNE	0.007	0.1	2005	0.0025	0.1616	0.0025	36	30	30	30	
16	HEXACHLOROBENZÈNE	0.05	0.01	2005	0.01	0.01	0.01	0	30	30	30	
17	HEXACHLOROBUTADIENE	0.1	0.1	2005	0.05	0.05	0.05	0	30	30	30	
18	HEXACHLOROCYCLOHEXANE alpha	0.1	0.1	2005	0.01	0.01	0.01	0	30	30	30	
18	HEXACHLOROCYCLOHEXANE beta	0.1	0.1	2005	0.01	0.01	0.01	0	30	30	30	
18	HEXACHLOROCYCLOHEXANE gamma	0.1	0.1	2005	0.01	0.01	0.01	0	30	30	30	
18	HEXACHLOROCYCLOHEXANE delta	0.1	0.1	2005	0.01	0.02	0.01	3	30	30	30	
19	ISOPROTURON	0.3	0.3	2005	0.01	1.915	0.01	28	30	30	30	
20	PLUMB	intermittent 0.4	7.2	2005	5	5	5	2	30	30	30	
21	MERCURE	intermittent 0.4	0.05	2005	0.05	0.05	0.05	0	30	30	30	
22	NAPHTALÈNE	2.4	2.4	2005	0.05	0.075	0.05	1	30	30	30	
23	NICKEL	intermittent 1.7	20	2005	2.5	3.7	2.5	2	30	30	30	
24	NONYLPHENOL	0.3	0.3	2005	0.25	0.25	0.25	0	30	30	30	
24	Octyl-mono-phenol	0.3	0.3	2005	0.25	0.25	0.25	0	30	30	30	
25	OCYLPHENOL	0.06	0.1	2005	0.25	0.25	0.25	0	30	30	30	
26	para-ter-actylphenol	0.06	0.1	2005	0.25	0.25	0.25	0	30	30	30	LD > H2
26	ORTHO-TRICHLOROBENZÈNE	0.020	0.020	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
27	PENTACHLOROPHENOL	2	0.4	2005	0.05	0.05	0.05	0	30	30	30	
28	BENZO(a)PYRÈNE	0.05	0.05	2005	0.0025	0.0569	0.0025	36	30	30	30	
28	BENZO(b)FLUORANTHÈNE	0.05	0.05	2005	0.0025	0.0779	0.0025	35	30	30	30	
28	BENZO(k)FLUORANTHÈNE	0.05	0.05	2005	0.0025	0.0566	0.0025	25	30	30	30	
28	BENZO(g,h,i)PÉRYLÈNE	0.010	0.010	2005	0.0025	0.0385	0.0025	36	30	30	30	
28	INDENO(1,2,3-cd)PÉRYLÈNE	0.010	0.010	2005	0.0025	0.0324	0.0025	31	30	30	30	
29	ISODRINE	0.1	1	2005	0.01	0.025	0.01	8	30	30	30	
30	TERTBUTYLETAN	0.0001	0.0002	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
30	tert-butylam-cation	0.0001	0.0002	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
31	TRICHLOROBENZÈNE	0.4	0.4	2005	2.5	2.5	2.5	0	30	30	30	LD > H2
31	1,2,4-TRICHLOROBENZÈNE	0.4	0.4	2005	2.5	2.5	2.5	0	30	30	30	LD > H2
32	TRICHLOROMETHANE (trichloroma)	12	2.5	2005	0.5	0.5	0.5	0	30	30	30	
33	TRIFLURALINE	0.02	0.02	2005	0.1	0.1	0.1	0	30	30	30	LD > H2
1	TOTAL DDT	25	0.020	2005	0.02	0.02	0.02	0	30	30	30	
1	para-para DDT	10	0.01	2005	0.01	0.01	0.01	0	30	30	30	
2	ALDRINE	0.01	0.01	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
3	DELDRINE	0.01	0.01	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
4	ENDRINE	0.005	0.005	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
5	ISODRINE	0.005	0.005	2005	0.01	0.01	0.01	0	30	30	30	LD > H2
6	TETRACHLORURE DE CARBONE	12	12	2005	0.05	0.075	0.05	3	30	30	30	LD > H2
7	PERCHLOROTHYLENE (tetrachloréthylène)	10	10	2005	0.35	1.12	0.35	4	30	30	30	
8	TRICHLOROTHYLENE	10	10	2005	0.25	0.25	0.25	1	30	30	30	

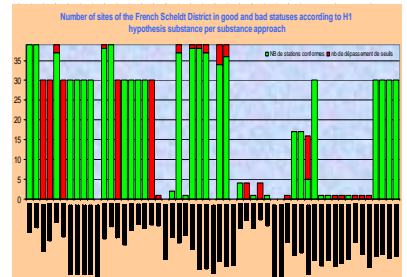
All parameters have been analysed for H1, H2 and H3 only one site (104.000) as this one belong the 2005 inventory related to the directive 76/464/CEE from the 4 th May 1976 « hazardous substances ».



Molecules which have (very) different limits of detection according to H1 et H2 hypotheses. They can induce a bad status depending on the hypothesis.

Cadmium. EQS is 5 µg/L for the French circular (H1) and all 4 sites for which data exist are in good chemical status. EQS is 0.08 µg/L for the EU (H2) and these 4 sites cannot meet the good chemical status
Chlorfenvinphos. EQS is 0.06 µg/L for the French circular (H1) and the 30 sites for which data exist cannot meet the good chemical status. EQS is 0.1 µg/L for the EU and then, 29 sites on a total of 30 are in good chemical status.

Molecules for which the detection limit is higher than the EQS whatever the hypothesis. These 13 molecules (pentabromodiphenylether, chlorpyrifos, para ter octylphenol, endosulfan, penta chlorobenzene, TBT, trichlorobenzene ; 1,2,4 trichlorobenzene, trifluraline, aldrine, dieldrine, endrine et isodrine) systematically prevent to meet the good chemical status.



No site can meet the good chemical status according to the three hypotheses. Only H1 hypothesis allow 7 sites to meet the good chemical status in one part because the number of parameters are very low (11/41) and in an other part because none of the 13 molecules which have detection limit/2 higher than their EQS has been analysed. No site can meet the good chemical status for hypotheses H2 and H3 because of the PAHs (sum of benzo(g,h,i) perylene and indeno(1,2,3-cd)pyrene).

Conclusion

The FWD requires the monitoring of 41 substances, many of them were not analysed till now or only in sediments. So, the simulation should be considered very carefully. Some molecules have (very) different EQSs according to EU and France proposals. These differences make impossible to meet the good chemical status if the lowest EQS (EU EQSs) are retained. That's the case for metals (Cd, Pb, Ni). We have to wait for the first surveillance network results to verify if this phenomena is valuable for all sites. For the chlorfenvinphos, The French EQS is too low to allow sites to meet the good chemical status. Even with H3 hypothesis, no site can today meet the good chemical status because the EQS of each of 13 molecules is lower than the detection limit. Two possibilities exist : adopting a lower detection limit or adopting a higher EQS. A by-law is being prepared and will determine the definitive EQS

REFERENCES

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